

## **25 YEARS AFTER THE ACCIDENT AT THE CHERNOBYL NUCLEAR POWER PLANT: RADIOECOLOGICAL LESSONS (THEORY AND PRACTICE)**

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The radiation accident at the Chernobyl NPP in 1986 which is one of the largest anthropogenic catastrophes causing radiation contamination of an area of some 150 000 km<sup>2</sup> has led to the formation of a unique test site for the long-term comprehensive studies into radionuclide migration in various natural environments (terrestrial and aquatic ecosystems) and effects of ionizing radiations on different natural and artificial biogeocenoses. Results from these studies in the Chernobyl affected area have enriched radioecological science with fundamental data on processes of radiation damage and post-radiation recovery at the population and ecosystem levels in natural conditions and transport regularities of the main radionuclides via the trophic chains in the environment.

In the field of biological effects of ionizing radiations, the main stages in the processes of development of radiation damage and recovery as a function of dose and dose rate were designated for a large range of plants and animals from different taxonomic groups; radiation effects were described with identification of dose dependences when using various indicators (cytogenetic, biochemical, morphological, population, cenotic, etc.). Natural plant and animal communities were ranked by radiosensitivity with a detailed study of the least radioresistant ecosystems. Low-level radiation effects in natural conditions in the long term after the accident are described. The derived data on radiation effects in the affected populations of plants and animals are applicable in the development of principles of radiation protection of the environment as well as in regulation of radiation effects on biota and establishment of dose limits. These have already been used in the documents of UNSCEAR and other international bodies.

In the field of radionuclide migration in the environment, data have been collected and parameters estimated in a long-term dynamics of radionuclide transfer via the trophic chains "soil-plant-animal-man" in terrestrial ecosystems and "water-silt-hydrobiont" in aquatic ones. Special attention is paid to agricultural chains of the radionuclide transport, since consumption of farm products which contain radionuclides is one of the main pathways of the public exposure. The basic radioecological paradigm has been proved, according to which the area of radiation damage to biota in the Chernobyl affected region is much less than the area where presence of man is limited or excluded due to the excess of permissible radionuclide content in environmental objects (primarily in agricultural products). The system of protective measures in agriculture is described (farming, plant production, animal production, reprocessing of products). Its introduction provides obtaining of foodstuffs in

compliance with the adopted standards in the bulk of the affected territory. First in the world practice results from the radioecological studies were realized on a large scale to mitigate consequences of a severe radiation accident.